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Original Article

What Determines Video Game Use?

The Impact of Users' Habits, Addictive Tendencies, and Intentions to Play

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Abstract. The present study explores the role of intentions, habits, and addictive tendencies in people's video game use. Although both habits and addictive tendencies may determine higher amounts of video game use, the present study examines whether the impact of habits and addictive tendencies on video game use may also be lower the less users intend to play (indicating a moderating role of intention). To test these assumptions, survey data were collected in two waves ($N = 351$), measuring causal factors in the first wave and outcomes (subsequent video game use) in the second. Results of mediation analyses reveal a positive impact of both habits and addictive tendencies on video game use that is partly affected by users' intentions. Furthermore, moderation analyses suggest that the impact of habits, but not of addictive tendencies, on video game use decreases, the less users intend to play. Taken together, these findings suggest that users' video game habits, addictive tendencies, and intentions jointly determine video game use.

Keywords: addiction, habit, intention, media choice, video games

Introduction

Playing video games is a popular leisure time activity (Williams, Yee, & Caplan, 2008). In 2008, 68% of American households contained at least one computer or video game console (Entertainment Software Association, 2009). At the same time, around 30% of the European population reported regularly playing video games (Nielsen Games, 2008). In conjunction with increasing numbers of video gamers, scientific research into *why* people play video games has grown as well (e.g., Griffiths, Davies, & Chappell, 2004; Hsu & Lu, 2004; Lee & LaRose, 2007; Lucas & Sherry, 2004; Ryan, Rigby, & Przybylski, 2006; Sherry, Lucas, Greenberg, & Lachlan, 2006; Williams et al., 2008). The majority of these studies have traditionally focused on expected gratifications as an explanation for why people play video games (e.g., Sherry et al., 2006). The implicit rationale of these approaches seems to be that video game use resembles intentional behavior, and that video game usage primarily follows from users' conscious and deliberate decisions to play.

However, recent approaches challenge the notion that video game use results from users' intentions to play (LaRose, 2010). These studies suggest that video game use results from a habit or even an addictive tendency to play (Lemmens, Valkenburg, & Peter, 2009; for a critical discussion of the term *addiction,* see LaRose, Lin, & Eastin, 2003). According to Lee and LaRose (2007; LaRose, 2010; LaRose et al., 2003), video game habits resemble automatic behavior and, as such, result in mindlessly initiated video game exposure. Because of their automaticity, habits are said to influence media use independent from what users intend. Addictive tendencies may determine video game use independently from what users intend, too. An addictive tendency to play can be defined as an inner urge or craving to use video games that is not the result of deliberate decisions (e.g., Lemmens et al., 2009). LaRose et al. (2003) argued that addictive media use actually reflects a deficient self-regulation. Users with stronger addictive tendencies may have occasionally but unsuccessfully tried to cut down their video game use. This suggests that their video game use is not always affected by their intentions. But do habits and addictive tendencies indeed operate independently from users' intentions?

Joint influences of users' habits, addictive tendencies, and intentions on video game use have not been examined to date in a single study. However, a joint analysis promises to link the two formerly separated views that video game use is either intentional or nonintentional (i.e., deliberate versus habitual or compulsive). A joint study of habits, addictive tendencies, and intentions to play video games allows examination of the extent to which habits and addictive tendencies affect video game use independently from users' intentions. It also allows examination of how these factors interlock to jointly determine video game use. For this reason, the present study investigates the joint impact of users' habits, addictive tendencies, and intentions on video game use. More specifically, the study starts from the assumption that both users' habits and addictive tendencies positively determine video game use. However, the positive impact of both habits and addictive

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tendencies on video game use may be affected (i.e., mediated and moderated) by users' intentions.

Video Game Habits

Many users probably play video games as a regular routine and therefore develop a habit of playing video games. Video game habits are mental constructs that develop by repetition of behavior (LaRose, 2010; Verplanken & Orbell, 2003). Frequency of behavior is the most crucial determinant of developing a habit. According to Verplanken and Orbell (2003, p. 1317), "the more frequently we perform a behavior, the more likely it is to be habitual." However, as LaRose (2010) points out, beyond the unchallenged importance of frequency, researchers differ in their opinion on whether habits depend on repeated behavior in stable contexts (e.g., same location, same time of the day; Ouellette & Wood, 1998) or on the repeated satisfaction of goals (e.g., gratifying exposure; Aarts & Dijksterhuis, 2000). Recent approaches integrate both perspectives by stressing that habits arise from the repetition of behavior in stable circumstances (e.g., external circumstances such as locations, internal circumstances such as obtained gratifications; LaRose, 2010; Verplanken & Wood, 2006). For example, it is more likely that users develop a video game habit if they frequently play video games in similar external circumstances (e.g., same PC or console, same room, same time of the day) and if their game usage continues to be gratifying. It seems reasonable to assume that this applies to the video game use of most users. Neal, Wood, and Quinn (2006) note that inferring habit strength from the frequency of past behavior "may be appropriate for actions that tend to be performed narrowly in a given context (e.g., using seat belts)" (p. 200). Video game use can be characterized as a narrow behavior that is usually conducted in stable contexts. Accordingly, it seems reasonable to infer video game habits from the frequency of past video game use.

As a habit, behavior turns into an automatic and unconsciously initiated activity (Aarts & Dijksterhuis, 2000; LaRose, 2010). For example, in the case of a video game habit, contextual cues (e.g., the video game console) that became associated with exposure throughout repetition may effectively trigger exposure. That is, users may start to use video games rather mindlessly, without any deliberate intention to do so (Ouellette & Wood, 1998). Referring to the characteristic features of automatic behavior proposed by Bargh (1994), Verplanken and Orbell (2003) argue that habits are usually controllable only to a limited extent, executed without awareness, and efficient. LaRose (2009, 2010) conceptualizes media habits within the framework of social-cognitive theory. According to this view, media habits are characterized by deficient self-control that builds on deficient self-observation, as "individuals may cease to pay conscious attention to their behavior" (LaRose, 2009, p. 16). This argument stresses, again, that habits resemble mindless behavior that may be initiated without users' deliberate intentions.

If users frequently played a video game in the past, they likely developed a habit which eventually increases the likelihood that they will play the game in the future as well. Accordingly, the more strongly users developed a habit to play, the more they may continue playing video games. Past studies confirmed this assumption. In a study by Lee and LaRose (2007), video game habits were positively correlated with amount of video game use. Related studies in the context of TV use also revealed positive relationships between habits and TV use (Koch, 2010; Ji & Wood, 2007; Wood, Quinn, & Kashy, 2002). Accordingly, the present study also builds on the expectation that

Hypothesis 1: Video game use is greater, the stronger users' video game habits.

Addictive Tendencies to Play Video Games

Several scholars have argued that video game use may sometimes resemble behavior that seems out-of-control; such video game use has been addressed as addictive or problematic video game use (Charlton & Danforth, 2007; Fisher, 1994; Griffiths & Hunt, 1998; Griffiths & Wood, 2000; Lemmens et al., 2009; Song, LaRose, Eastin, & Lin, 2004; Wan & Chiou, 2006). LaRose et al. (2003), however, suggest restricting the term *addiction* to severe forms of media addiction that require clinical treatment. They argue that "problematic" or "excessive" media use in nonclinical populations may be more appropriately addressed as *unregulated media usage* that is based on deficient self-regulation. The present approach uses the phrase *addictive tendencies to play video games* rather than *video game addiction* to address those mechanisms in users that contribute to mild forms of media addiction symptoms in users of nonclinical samples. These symptoms include an urge to play, mental preoccupation with game playing, withdrawal symptoms, and problematic outcomes such as deceiving others about the amount of their game playing. We consider an inner urge or craving to play video games as the conceptual core of addictive tendencies. This urge or craving may, but does not necessarily, result in impulsive (and, thus, nonintentional) exposure to video games. The urge or craving may be best understood as a strong inner wish to play video games. Within individuals, this wish arises rather automatically rather than based on deliberate decisions.

Users may develop an addictive tendency to play video games because the usage starts to fulfill an important role in the satisfaction of their biopsychological needs (Griffiths, 1996). For example, addictive tendencies may develop if video game use is negatively reinforced in that it allows users to alleviate depressive moods and other negative states. In contrast to mindless video game habits, an addictive tendency is indicated by various symptoms such as users' craving for increasing amounts of video game play, mental preoccupation with game playing, and irritation if video game use is not possible. In contrast to habits, addictive tendencies to play video games may also result in (mildly) problematic outcomes in users' everyday lives (e.g., the tendency to deceive or lie about the excessive use). Only strong addictive tendencies may trigger serious problems in the everyday life of a user, however (e.g., loss of friendships). Whereas clinical levels of media addiction may usually be accompanied by an awareness that the

behavior is problematic, most users may consider their media use (that is partly resulting from addictive tendencies) unproblematic and enjoyable. Accordingly, most users may not find it problematic if their video game use is partly determined by an urge or craving to play; especially if this addictive tendency is only weakly developed, problematic outcomes are sparse, and the video game use is still enjoyed.

Devoting excessive amounts of time to play video games may be considered a defining characteristic of addictive tendencies to play video games (Lemmens et al., 2009). The findings of various studies suggest that stronger addictive tendencies result in higher amounts of video game use (e.g., Lee & LaRose, 2007; Lemmens, Valkenburg, & Peter, 2011). In line with these results, the present approach also expects that

Hypothesis 2: Video game use is greater, the stronger users' addictive tendencies are to play.

Potential Roles of Users' Intentions

An alternative impetus to playing video games is intention. Intentions are self-instructions to perform particular behaviors (Triandis, 1980). Intentions usually represent conscious "plans of action in pursuit of behavioral goals" (Ouellette & Wood, 1998, p. 56). Most scholars argue that they are based on reflective decision making (Strack & Deutsch, 2004) and embed a conscious choice to initiate a certain behavior or to stop it. Some scholars argue that intentions represent the free will of individuals (e.g., Baumeister, 2008). The strength of an intention impacts upon the likelihood that the intended behavior will be initiated or stopped, because "the stronger a person's intention, the more the person is expected to try" (Ajzen & Madden, 1986, p. 454).

Research related to video game habits and addictive tendencies suggests that video game use primarily results from automatic or compulsive processes rather than from users' deliberate intentions. Does the evidence provided by these more recent studies imply that intentions do not affect video game use at all? It may be unwise to drop intentions from the equation too quickly. Rather, it may be reasonable to think of habits, addictive tendencies, and intentions as processes that are not mutually exclusive, but operate in parallel or even intertwined ways. As Ouellette and Wood (1998) remark, behavior may often be jointly determined by these processes, rather than being purely habitual, addictive, or intentional. Such a view also corresponds to recent dual-system models of behavior (e.g., Hofmann, Friese, & Wiers, 2009; Kuhl & Goschke, 1994; Strack & Deutsch, 2004; Strack, Werth, & Deutsch, 2006) that argue that behavior is usually simultaneously guided by both intentional (or reflective) and nonintentional (automatic or impulsive) processes. In line with this idea, video game habits, addictive tendencies, and intentions may jointly predict video game use. In addition, rather than being unrelated determinants of video game use, habits, addictive tendencies, and intentions may be intertwined determinants of video game use.

Intention as a Mediator

Except when intentions are formed specifically to counter established responses, people tend to derive intentions from their past habitual behavior (Ouellette & Wood, 1998, p. 56). Just as people tend to infer attitudes from past behavior (Bem, 1972), people may infer intentions from reflections on habitual media consumption (LaRose, 2010). As a consequence, habits and intentions tend to be positively correlated (Ji & Wood, 2007; Koch, 2010; Verplanken & Orbell, 2003). However, the positive correlation between habits and intentions may point to a more complex causal structure. As Ouellette and Wood (1998, p. 56) argue, "frequency of past behavior can affect future behavior directly, through automatic repetition of previously established routines, or indirectly, mediated through conscious intents to behave." This would suggest that the impact of habits on video game use is partly *mediated* by intentions. However, this assumption has never been fully tested to date. A meta-analytic study by Ouellette and Wood (1998) provides only preliminary evidence, but not a full mediation analysis. In their study, both habits and intentions were positively correlated and simultaneously predicted future behavior. Intentions were a stronger predictor of infrequent behavior that was conducted in unstable contexts, whereas habits were a stronger predictor of behavior that was repeatedly conducted in stable contexts, such as watching television. Koch (2010) also examined the joint impact of users' television habits (assessed with the Self-Report Habit Index, SRHI; of Verplanken & Orbell, 2003) and intentions on television use. Television habits and intentions were substantially, positively correlated. Furthermore, in multiple regression analysis, television habits and intentions simultaneously predicted television use. These findings replicate the general results from Ouellette and Wood (1998) and show that habits and intentions may be correlated, but exert unique influences on media use. However, Koch also did not test a full mediation model, leaving the question unanswered of whether intentions mediate the impact of habits on media use.

Because people tend to derive intentions based on their habits, as Ouellette and Wood (1998) argue, the positive correlations obtained between habits and intentions can be interpreted in a causal order, with habits as the cause and intentions as the outcome. Furthermore, both habits and intentions maintain a unique influence on video game use, as the studies by Ouellette and Wood (1998) and Koch (2010) suggest. This implies that the general impact of habits on video game use may be split up into two different effects: A direct effect of habits on video game use (independent from intentions), and an indirect effect of habits on video game use, carried via users' intentions. The indirect effect would simply represent the extent to which users become aware of their automatic behavioral tendency to use video games that underlies their habitual use. In an effort to make sense of this behavioral tendency, they would interpret it as something they like to do and want to do – that is, as an intention (Bem, 1972). Once formulated, these intentions may exert an unique influence on video game use. Accordingly, habits may affect video game use, partly

because they trigger stronger intentions to play. This implies that the impact of habits suggested in Hypothesis 1 is partly mediated by users' intentions (Rucker, Preacher, Tormala, & Petty, 2011):

Hypothesis 3a: The impact of habits on video game use is partly mediated by intentions.

The effect of addictive tendencies to play on video game use may be partly mediated by users' intentions as well. Users with stronger addictive tendencies tend to experience urges or cravings to play video games (Lemmens et al., 2009). As long as addictive tendencies are not fully recognized or considered very problematic by a user, it is unlikely that they will form intentions to cut down their amount of game use. Accordingly, inner urges or cravings to play may trigger stronger intentions to play. These intentions, once formed, may guide video game use as well. Accordingly, intentions may partly explain the expected positive impact of addictive tendencies on video game use.

Hypothesis 3b: The impact of addictive tendencies on video game use is partly mediated by intentions.

Intention as a Moderator

Past studies suggest that media users' habits and intentions also interact with each other (e.g., LaRose, 2010; Ouellette & Wood, 1998). For example, in a study by Limayem and Cheung (2008), habits moderated the influence of students' intention to use an online information system. The influence of intention on amount of system use was weakened by stronger habits. In another study by Ji and Wood (2007), watching television news followed people's intentions, but the strength of the influence of intention was moderated by habit: The impact of intention was reduced among people with stronger habits of watching television news. Similar findings were reported by Koch (2010). In his study, the impact of intentions on television use was weaker among people with relatively strong, as compared with people with relatively weak, television habits. Taken together, these studies suggest that users' habits and intentions interact. Studies reviewing this interaction interpret it as showing that stronger habits lead to a smaller impact of intentions on media use. However, the opposite logic seems equally plausible – that habits determine media use but are moderated by intentions – which is in line with the findings of the previously reviewed studies.[1]

On the one hand, intentions may moderate the impact of habits and addictive tendencies on video game use, if users just start to play video games or a specific game, and habits or addictive tendencies to play are barely developed. Under these conditions, video gaming resembles new behavior. If habits or addictive tendencies have barely been developed, greater video game use may primarily result from stronger intentions to play. On the other hand, users may sometimes develop video game habits or addictive tendencies to play that they wish to stop. For instance, users may perceive their own frequent playing of video games as a bad habit that they wish to regulate. "Conscious intentions counter habitual patterns when people attempt to change bad habits," according to Ouellette and Wood (1998, p. 56). Accordingly, users with a strong habit to play video games may sometimes develop intentions not to play. Similarly, some individuals with addictive tendencies to play video games may try to cut down their amount of video game play (Lemmens et al., 2009). In such cases, individuals with an addictive tendency to play video games may hold only weak intentions to play or may intend to stop playing. Under these circumstances, users' intentions may not directly follow from habits or addictive tendencies to play (Vollmer, 2001).

Taken together, these examples suggest that a habit of playing or addictive tendency to play video games may not always determine congruent intentions (as suggested by the mediation logic). Rather, intentions may be partly formed independently from habits and addictive tendencies. They may affect or moderate the impact of habits and addictive tendencies on video game use. For example, the impact of both habits and addictive tendencies on video game play may be stronger the more users intend to play, but may be dampened if users do not intend to play. The question remains, however, to what extent intentions indeed moderate the effect of video game habits and addictive tendencies to play on video game use.

Research Question 1: Do users' intentions moderate the impact of (a) their habits and (b) their addictive tendencies on video game use?

Method

Design

To examine the effects of habits, addictive tendencies, and intentions on video game use, a two-wave online survey

[1] Because moderations are eventually tested with interaction terms of two variables, the independent variable and the moderator are statistically interchangeable. At the heart of the moderation lies a significant interaction of two variables. It remains a theoretical question which of the two variables is the moderator or the independent variable. Accordingly, findings that show that habits moderate intentions can also be interpreted as showing that intentions moderate habits. For example, Ji and Wood (2007) reported a significant interaction effect that confirmed that habits moderate the impact of intention on TV use. Their subsequent simple slope analyses revealed that the impact of intentions was weaker among higher levels of the moderator "habit." Still, intentions significantly predicted TV use at all levels of the moderator, even if strong habits existed. A reanalysis of this data would show that intentions also moderate the impact of habits on TV use: The interaction term would be identical (and significant), the simple slope analysis would show that the effect of habits on TV use is weaker among high levels of the moderator "intention" – that is, if strong intentions exist. To provide another example: A reanalysis of the data from Koch (2010) in a moderated regression shows a significant interaction of TV habit and intention on amount of TV use. Follow-up simple slope analyses with intention as the moderator show that the conditional effect of habit on TV use turns weaker and is eventually nonsignificant at higher levels of intention.

was conducted. In general, media use can be predicted more accurately if it is clearly defined in terms of its content (e.g., playing a video game), a quantifier (i.e., frequency of use), and a duration (e.g., the next 2 weeks; Ajzen, 2006). Therefore, the present study focused on predicting the use of a specific video game within a 2-week period.

In the first survey, respondents were asked to name a specific video game. To increase the variance in the constructs assessed, respondents were asked randomly to name either their current favorite video game or their least favorite game (both termed "named video game" throughout the remainder of this article). All theoretical constructs were subsequently assessed with respect to the named video game (e.g., intention to play [named game] within the next 2 weeks). At the end of the first survey, respondents received an individual key code. This key code was generated automatically based upon participants' responses to four personal questions: for example, "What is the second and third letter of your mother's first name?" "What are the last three letters of the town where you were born?" or "Please name the last two digits of the year you were born."

A second survey was administered 2 weeks later. Respondents received an automated e-mail containing their key code and a link to the second survey. After logging in to the second survey, participants were asked how much they had played the named video game over the past 2 weeks.[2] To encourage participation, all respondents who completed the second questionnaire were entered into a randomized drawing for five gift certificates for a well-known online store, each worth US $60.

Sample

The study was promoted as a survey about video gaming. Solicitations appeared on selected US websites that were related to media and were willing to promote the survey (e.g., comcast.com). The final sample consisted of a total of 351 valid cases that represented respondents who had filled out both the first and second survey.[3] The age of respondents ranged from 11 to 58 years with a mean age of 22 years (SD = 5 years). A great majority of the respondents were male (96%). When asked about the highest educational level achieved so far, the majority of respondents reported having either "some college" experience (31.6%) or a degree at "high school or equivalent" (30.2%). All respondents reported playing a video game at least once during the past 5 years. Asked about their average video game use, respondents reported playing video games 21 hours per week (SD = 15 hours, range between 2 and 90 hours). When compared with representative data about video game users in the United States (Entertainment Software Association, 2009; Nielsen Games, 2008), the current sample was skewed toward younger male players with comparatively heavy video game usage.

Measurements

Video Game Use

Ninety-two percent of the sample completed the study with respect to their favorite video game, and 8% with respect to a game they disliked.[4] Respondents were very familiar with their named game (M = 6.67, SD = 0.70, on a scale ranging from 1 "not at all familiar" to 7 "very familiar"). Using 15 predefined genres, most participants categorized their named video game as a "fantasy/role-playing" game (39%), followed by "shooters" (23%) or "action/adventure" (16%).

The dependent variable of the present study, amount of video game use, was measured in the second wave. Respondents were asked on how many days they had played their named game during the last 2 weeks (i.e., in the time between the first and second wave of the study) and how many hours per day they had spent playing this game in that period. Answers were compiled in an index. The index indicated the total number of hours spent with the video game in the last 2 weeks (days × average hours per day; M = 19.46 hours; SD = 21.69 hours). Analyzing z-scores of the variable as suggested by Field (2009, p. 102) resulted in the detection of various outliers (scores > 3.29). To cope with these outliers, the variable was log(x + 1)-transformed.

Video Game Habit

All predictors of video game use were assessed in the first wave of the study – that is, prior to the measurement of video game use. Users' video game habits were inferred using the frequency of past behavior (for reviews, see Ouellette & Wood, 1998). One may argue that better alternatives for measuring media habits exist (e.g., LaRose, 2010). Verplanken

[2] Retrospective assessments of individual media use can easily be flawed (Gaskell, O'Muircheartaigh, & Wright, 1994; Greenberg et al., 2005) as respondents may be able to recall single events only vaguely and may instead rely on heuristics, resulting in a biased estimation of usage time. To overcome this problem, we applied a relatively short recall period of 2 weeks.

[3] In this data set, we had already removed 100 cases, of those who had neither played the named video game in the last week (zero scores in the habit measure), nor 2 weeks later (zero scores in the amount-of-use measure). These cases heavily skewed the related variables and resulted in artificially inflated relationships. Including all 100 cases in the analysis leads to identical findings (directions and significances remain), except for (a) the moderation of the impact of addictive tendencies on video game use by intentions turns significant, and (b) the mediation suggests that the direct effect of addictive tendencies on video game use is weaker than the indirect effect carried on by intentions.

[4] Participants were randomly assigned to answer questions about a game they either liked or disliked. This was not an experimental manipulation, but served only the goal of increasing variance in the measures. Participants were first randomly assigned and then asked if they could name a video game they currently liked or disliked. The different group sizes between the conditions resulted from the fact that fewer people could name a game they currently disliked and, therefore, were filtered out. In addition, more people with disliked games were among the removed cases with zero scores in both the habit and amount-of-use measures.

and Orbell (2003, p. 1315) suggested, however, that "because habits develop and gain strength by satisfactory repetition of behavior …, it is not unreasonable to accept a measure of past behavioral frequency as a measure of habit strength" (but also see Verplanken & Wood, 2006). Frequency of past behavior may be a considerably valid measure of habitual behavior as long as it is plausible that the behavior is repeatedly conducted in stable conditions. We applied the frequency of past behavior as a habit measure in the present study because we assumed that respondents tended to play their named video game (e.g., *World of Warcraft*) in a stable context such as an identical location (e.g., living room), social setting (e.g., with online friends), and time of the day (e.g., after school or university). To assess video game habits, respondents were asked in the first wave on how many weekdays they had played their named game in the past week, how many hours per weekday they had spent playing their named game in the past week, and how many hours they had spent playing their game during the last weekend. Answers were compiled in an index ($\alpha_{\text{z-standardized variables}} = .58$). This index indicated the total number of hours a respondent had spent playing the video game in the last week prior to Wave 1 (weekdays × average hours per weekday + weekend hours; $M = 16.28$ hours; $SD = 13.94$ hours). To cope with outliers in the habit index, the variable was also log(x + 1)-transformed.

Addictive Tendency

Users' addictive tendency to play video games was measured using an adapted version of a 9-item scale ranging from 1 (*do not agree at all*) to 7 (*totally agree*) previously utilized by LaRose and Eastin (2004). The original scale resulted from factor analyzing an initial item pool that was primarily derived from measures of problematic media use or media addiction. According to LaRose and Eastin (2004), the nine items reflect deficient self-regulation, consisting of a deficient judgment of one's own video game use, as well as a failure to successfully apply self-reactive rewards and punishments to moderate the behavior. In addition to these aspects describing deficient self-regulation, the scale also seems to capture other aspects of what has previously been addressed as problematic video game use or video game addiction (Lemmens et al., 2009) – namely, mental preoccupation, withdrawal symptoms, and potentially problematic outcomes such as concealing the amount of time away from family or friends spent playing. All items of the scale are listed in the Appendix. Items were compiled in a mean index ($\alpha = .86$; $M = 2.21$; $SD = 1.06$). In general, addictive tendencies were only marginally pronounced in the present sample; the sample mean was considerably low. Only 14 (4%) of all respondents agreed strongly (scores of 6 or 7) to the potentially problematic outcome of sometimes concealing the amount of time they spent playing from others. Only 40 (11.4%) of all respondents tended to agree at least moderately (scores of 4 or higher) to five or more of the presented items (see LaRose et al., 2003). To cope with outliers in the index, the variable was log-transformed.

Intention

Intentions were measured following suggestions in the literature (Ajzen, 2006; Francis et al., 2004; Gagné & Godin, 2000). Respondents' intention to play the named video game in the subsequent 2 weeks was measured using five items on a 7-point scale, ranging from −3 (*Strong intention not to play*) to +3 (*Strong intention to play*).[5] For example, one of the items stated, "I would like to play [named game] in the next 2 weeks," ranging from −3 (*Strongly disagree*) to 3 (*Strongly agree*). All items of the scale are listed in the Appendix. Items were compiled in a mean index ($\alpha = .97$; $M = 2.45$; $SD = 1.22$).

Results

Preliminary Analysis

Table 1 shows the zero-order correlations among all variables. Amount of video game play was significantly more correlated with an existing habit to play than with addictive tendencies (Steigers's $Z = 3.89$, $p < .01$) in the current sample. Video game use was not significantly more correlated with habit than with intentions, however (Steiger's $Z = 1.19$, ns). A preliminary regression in which video game use was simultaneously regressed on habits, addictive tendencies, and intentions ($R^2 = .37$, $p < .01$) suggested that habits exert a stronger direct influence on video game use, $\beta = .39$, $t(347) = 8.37$, $p < .01$, than intentions, $\beta = .29$, $t(347) = 6.33$, $p < .01$, or addictive tendencies, $\beta = .12$, $t(347) = 2.76$, $p < .01$.

Test of Hypotheses

Mediation

Hypothesis 1 argued that video game use is greater, the stronger users' video game habits. Hypothesis 2 argued that video game use is greater, the stronger users' addictive tendencies to play. However, Hypothesis 3a expected intentions to partly mediate the effect of habits on video game use, and Hypothesis 3b expected a mediating role of intention underlying the impact of addictive tendencies on video game use. To test these predictions, two mediation analyses were conducted with video game use as the dependent variable, intentions as a mediator, and either habits or addictive tendencies as the independent variable. The mediation analyses included the Baron and Kenny (1986) steps, but also bias-corrected bootstrapping estimations and significance tests

[5] Please note that a score of −3 actually indicated strong disagreement with statements reflecting an intention to play. We interpreted this strong disagreement as evidence for an intention not to play.

Table 1. Zero-Order correlations of the measured variables

	USE	HAB	ADD	INT
Video game use (USE)	–			
Habit (HAB)	.52**	–		
Addictive tendency (ADD)	.30**	.27**	–	
Intention (INT)	.46**	.35**	.27**	–

Note. *$p < .05$; **$p < .01$ (2-tailed).

of the size of the indirect effects, as recommended by Hayes (2009) and Preacher and Hayes (2004).

The first mediation model examined the effects of video game habit and intentions on video game use. Applying the SPSS macro by Hayes (2009), a significant total effect of habit on amount of video game use was obtained in a first step, $b = 0.79$, $SE = .07$, $t(350) = 11.43$, $p < .01$. This finding confirmed Hypothesis 1 and showed that stronger video game habits result in greater video game use. A second step revealed a significant effect of habit on intention, $b = 0.55$, $SE = .08$, $t(350) = 7.00$, $p < .01$. A third step revealed a significant effect of intention on video game use, controlled for habit, $b = 0.31$, $SE = .04$, $t(349) = 6.92$, $p < .01$. Controlled for intention, the initial influence of habit on video game use was slightly reduced, yet the direct effect of habit on video game use was highly significant, $b = 0.62$, $SE = .07$, $t(349) = 8.98$, $p < .01$. Proving mediation, the indirect effect of habits on video game use over intention was also highly significant, $b = .16$, $SE = .04$, 99% CI [0.08, 0.27], based on 5,000 bias-corrected bootstrap samples. These results confirm Hypothesis 3a. More specifically, the results show that the total effect of habits on video game use rests on two separate effects: A much stronger direct effect of habits on video game use, and a considerably weaker albeit still significant indirect effect of habits that is carried by users' intentions to play.

The second mediation model examined the effects of addictive tendencies and intentions on video game use. A first step revealed a significant effect of addictive tendencies on video game use, $b = 0.78$, $SE = .13$, $t(350) = 5.97$, $p < .01$. This result confirms Hypothesis 2 and shows that video game use is greater as users' addictive tendencies to play are stronger. A second step showed a significant effect of addictive tendencies on intention, $b = 0.71$, $SE = .14$, $t(350) = 5.16$, $p < .01$. A third step revealed a significant effect of intention on video game use, controlled for addictive tendencies, $b = 0.39$, $SE = .05$, $t(349) = 8.48$, $p < .01$. The initial influence of addictive tendencies on video game use was reduced when controlling for intention, yet the direct effect of addictive tendencies on video game use remained highly significant, $b = .50$, $SE = .12$, $t(349) = 4.06$, $p < .01$. The indirect effect of addictive tendencies (over intentions) was also significant, $b = 0.28$, $SE = .07$, 99% CI [0.13, 0.48], based on 5,000 bias-corrected bootstrap samples. These results confirm Hypothesis 3b and show that intentions partly mediate the impact of addictive tendencies on video game use. More specifically, the total effect of addictive tendencies on video game use was split up into a stronger direct effect on video game use and a weaker but still considerably strong indirect effect of addictive tendencies on video game use that was carried by intentions.[6]

Moderation

Research Question 1 asked if users' intentions moderate the impact of (a) their habits and (b) their addictive tendencies on video game use. The research questions was examined in two separate moderated regressions, following suggestions by Hayes, Glynn, and Huge (2008) and procedures described by Hayes and Matthes (2009). To derive meaningful zero scores for the predictors entered in the regression model, habit and addictive tendency were centered at their mean prior to the analyses. To test for potential interactions with intention, two interaction terms were computed by multiplying intention with the mean-centered habit score and the mean-centered addictive tendency score, respectively. In a next step, hierarchical regressions were computed. Amount of video game use was regressed on the mean-centered habit score and intention in Step 1 of the regression, and additionally on the interaction term of both variables in Step 2 of the regression. The same procedure was conducted with addictive tendency. A moderation was indicated by a significant amount of additionally explained variance in Step 2 of the model, and by a significant interaction term that explained variance on top of the two other variables already entered in the model. Simple slope analyses employing procedures by Hayes and Matthes (2009) were conducted to examine significant interactions.

Results of the two moderated regressions are displayed in Table 2. As the table shows, only the interaction term, habit × intention, explained a significant amount of additional variance in video game use if entered in a second step of the regression, whereas the term. addictive tendency × intention, did not. Furthermore, only the interaction term, habit × intention, yielded a significant additional effect on video game use, whereas the term, addictive tendency × intention, did not. These results suggest that the effect of habits on video game use is moderated by users' intentions. However, intentions do not moderate the effect of an addictive tendency on video game use.

Simple slope analyses were conducted to examine the nature of the significant moderation of habits. The common practice to examine the effect of the independent on the dependent variable at two (often arbitrarily selected) levels of the moderator was replaced by a more advanced analysis that revealed the estimated effect of the independent on the dependent variable at all levels of the moderator. Results are displayed in Figure 1. The figure shows the estimated conditional effects (indicated by the steepness of the simple regression slope, i.e., the unstandardized regression

[6] Note that we also examined both mediation analyses with video game use either controlled for the influence of addictive tendencies (in the mediation model of habits) or of habits (in the mediation model of addictive tendencies). The findings did not change.

Table 2. Moderated regressions: Predicting video game use with habit or addictive tendency, and intention as moderator

	Step 1		Step 2	
Variable	*B*	*SE B*	*B*	*SE B*
Habit	.62**	.07	.41**	.11
Intention	.31**	.04	.37**	.05
Habit × intention			.10*	.04
R^2	.360		.371	
F for change in R^2	98.07**		5.57*	
Addictive tendency	.50**	.12	.45	.33
Intention	.40**	.05	.40**	.07
Addictive tendency × intention			.02	.12
R^2	.248		.248	
F for change in R^2	57.36**		0.04	

Note. Intention ranged from −3 to +3, with 0 indicating a neutral middle; habit and addictive tendency were mean-centered prior to the analysis (so that 0 indicated the sample mean). *p < .05; **p < .01.

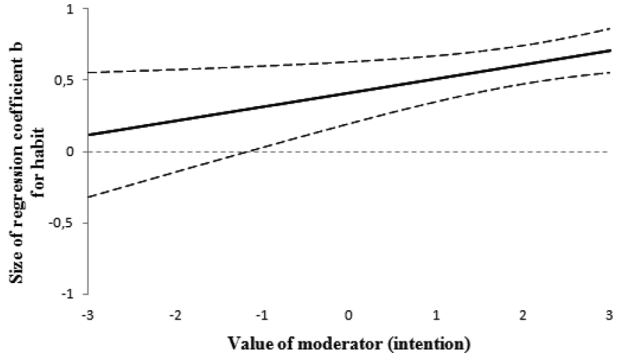

Figure 1. Conditional effects of habit on amount of video game use. The bold line shows the estimated impact (represented by the estimated unstandardized regression coefficient *b*) of habit on video game use at each level of the continuous moderator *intention.* The dashed lines show the upper and lower boundaries of the 95% confidence interval of the estimated impact. The area of the dashed lines that includes 0 indicates that at these levels of the moderator (*intention*) the effect of habit on video game use is nonsignificant. The figure shows that the influence of habit on video game use is stronger, the more users intend to play, but turns nonsignificant if users hold only weak intentions (or even intend not to play).

coefficient *b*) of habits on video game use on each level of the continuous moderator *intention.* The dashed lines above and below the bold line indicate the 95% CI of the conditional effect, and, therefore, also mark regions of significance. As the figure shows, the effect of habit on video game use was stronger at higher levels of the moderator – that is, when people hold stronger intentions to play. The effect of habits on video game use turned weaker, however, the less people intended to play, and dropped to nonsignificance at intention scores of −1.18 and lower. This result answers Research Question 1 and suggests that habits only influence video game use if users also intend to play. However, video game habits may have no significant influence on video game use if users hold only weak intentions to play or even intend not to play.

Discussion

The present study examined the effects of users' habits, addictive tendencies, and intentions on video game use. Rather than looking at each factor separately, the study focused on the intertwined effects of the three factors on video game use. It was argued that both habits and addictive tendencies result in more video game use. Furthermore, it was argued that intentions may mediate the effects of habits and addictive tendencies on video game use. In addition, we explored whether intentions also played a moderating role. The findings obtained in the present study confirm the expectations and provide answers to our questions. Within a 2-week period, users spent more time playing a video game the more frequently they already played the game in the past (indicating a habit) and the stronger their addictive tendency to play the game. However, this effect of both habit and addictive tendencies on video game use was partly affected by users' intentions to play the game, indicating a mediation effect. Users intended more strongly to play the video game, the stronger their habit and addictive tendency to play the game, and this intention, in turn, affected video game use. The indirect effect of intentions was considerably smaller than the direct effect of either habit or addictive tendencies on video game use. Furthermore, the mediating effect of intentions was weaker in the context of habits than in the context of addictive tendencies. Habits seem to affect video game use primarily in ways that operate independently from users' intentions (LaRose, 2010). A craving or urge to play video games, however, may sometimes give rise to congruent intentions that, once developed, simultaneously foster video game use. In addition to the obtained

mediation, users' intentions also moderated the effect of habits on video game use. The impact of habits on video game use was stronger, the more users intended to play the game, but it became weaker and nonsignificant if users held only weak intentions to play (or even intended not to play the video game). In contrast, intentions did not moderate the influence of addictive tendencies on video game use.

Study Implications

Mediation

The findings obtained complement and extend the existing research on why people use video games. The present study replicates the findings of the few existing studies, which suggested that stronger video game habits (Lee & LaRose, 2007) and addictive tendencies (e.g., Lemmens et al., 2011) result in higher amounts of video game use. Moving beyond past studies, the present approach provides evidence that this effect is partly due to users' intentions. That intentions may mediate the influence of existing habits on behavior has been suggested in a general context by Ouellette and Wood (1998), but a mediation model has not been tested in previous studies. Ouellette and Wood conceptualized two potential routes through which past behavior may affect future behavior: through automatic repetition of previously established routines or habits, or indirectly mediated through conscious intent to behave. The mediation obtained in the present study confirms the general notion of Ouellette and Wood that, to a smaller extent, the total effect of habits on video game use is based on intentions. However, to a greater extent, habits influenced video game use directly in the present study. In combination with the finding that habits were the strongest predictor of video game use if simultaneously pitted against intentions and addictive tendencies, this suggests that video game use is best understood as a relative habitual behavior.

Past studies did not examine a mediating role of intentions in the context of addictive tendencies to play video games. The present findings suggest that addictive tendencies partly result in higher video game use because they trigger stronger intentions to play. However, the direct effect of addictive tendencies influenced video game use to a greater extent in the present study, independently from what users intended. This finding reflects that the core of addictive tendencies may be an urge or craving to play video games. This urge or craving may frequently trigger impulsive exposure behavior that is unrelated to what users intend.

Moderation

The present study also suggests that users' intentions moderate the effect of habits on video game use. The present study is the first suggesting that intentions may moderate the impact of addictive tendencies on video game use. Past research has already examined the interplay of intentions and habits in the context of media use (Ji & Wood, 2007; Koch, 2010; Ouellette & Wood, 1998; Wood et al., 2002; see for an overview LaRose, 2010), suggesting that habits and intentions represent two competing mechanisms. They found that the impact of intentions on media use is weaker, the stronger the habit (and vice versa). In contrast, the present study found that the impact of habits on video game use is stronger, the stronger users' intentions to play are, but weaker when users' intentions to play are weaker. In the present study users appeared capable, to a certain extent, of intentionally regulating their habits to play video games. In general, users may be capable of stopping their habitual video game use if they consider it a bad habit (Vollmer, 2001). Future studies should try to explore this moderating role of intentions further in more advanced designs such as intervention studies or longitudinal analyses.

The influence of addictive tendencies to play video games was not moderated by users' intentions in the present study. Addictive tendencies were conceptualized in the present approach as a mild, common, and mostly unproblematic form of video game addiction, with an urge or craving to play as a conceptual core. The present findings suggest that such mild forms of video game addiction may also influence game use independently from what users intend. This finding extends the conclusion drawn from the mediation analysis above and suggests that addictive tendencies may result in occasional impulsive exposure to video games even in the presence of *incongruent* intentions (LaRose et al., 2003; Strack & Deutsch, 2004). In this respect, addictive tendencies seem to contribute to video game use that is "out of control" (Lemmens et al., 2009; Wan & Chiou, 2006). The precise nature of this mechanism needs to be explored in future studies, however.

Limitations and Future Research

The present findings should be interpreted within this study's limitations. Results were obtained from a convenience sample skewed toward younger male players who frequently used video games. Although respondents answered questions with respect to either a favorite or disliked video game, most were quite familiar with the named game, and despite random assignment to conditions, more people reported on their use of a liked rather than a disliked video game. The present study therefore tells us more about the use of an already liked and used game, rather than use of a novel or disliked video game. In general, differential mechanisms underlie the initiation, maintenance, regulation, and termination of media behavior (Gollwitzer, 1990; Hofmann et al., 2009; Ouellette & Wood, 1998; Rothman, Baldwin, & Hertel, 2004). Therefore, future studies should distinguish more carefully among different stages of video game use, including users' engaging in a video game for the first time (initiation), continuing to use a video game (maintenance), or attempting to regulate use of a game or even ceasing to play a game (quitting).

The measures applied in the present study may be discussed as well. First, the study applied a standard measure of intention. While the items of this measure plausibly assess the strength of users' intention to play, users'

intentions to stop playing were indirectly inferred from strong disagreement to the items of the scale. It would be useful, however, to measure directly the strength of users' intentions to play, versus the strength of intentions to stop playing in future studies. Furthermore, the intention construct seems to cover slightly different aspects – namely, the willingness or effort to try initiating or stopping a behavior versus a conscious and deliberate decision toward a behavior (by weighing pros and cons) and the planning of that behavior. It could be argued that the results obtained in the present study are more strongly linked to users' "willingness to play video games" rather than their conscious and elaborate decision making and development of action plans. Accordingly, future studies may try to assess and test the different aspects of users' intentions in a more differentiated way.

Second, the present study adapted a measure intended to assess deficient self-regulation of media use (LaRose & Eastin, 2004), to measure users' addictive tendencies to play video games. However, alternative measures to capture video game addiction have been suggested in the recent past and may be applied in future studies (e.g., Lemmens et al., 2009). To substantiate the present findings, future studies may also apply more conservative assessments of video game addiction. Beard and Wolf (2001), for example, examined online addiction based on the eight symptoms suggested by Young (1996). They outlined that several symptoms must be present before one may infer an online addiction (e.g., tolerance, withdrawal symptoms, relapse, preoccupation, and at least one of three items tapping into problems). The present finding that intentions moderated the impact of addictive tendencies on video game use may be reexamined in future studies by applying the more conservative approach proposed by Beard and Wolf (2001).

Third, the present study relied upon amount of past video game use to infer video game playing habit. This measure has been applied in the literature and has also been deemed appropriate by experts in the field (Neal et al., 2006). However, from a critical perspective, the present study basically examined the effect of past video game use on subsequent video game use. This, certainly, implied a number of problems. For example, habit (i.e., video game use in the past week assessed in Wave 1) and actual video game use (i.e., video game use during the past 2 weeks assessed in Wave 2) were measured in almost identical ways. This may have artificially inflated the correlation between both measures. Because they were measured in almost identical ways, habits and video game use were also more likely to be affected by a joint underlying cause that was not controlled for in the present study. Accordingly, it is recommended to apply alternative assessments of video game habits in future studies (Ajzen, 2002). Verplanken and Orbell (2003, p. 1324) review alternative habit measures and note that "it is important to consider habit as a psychological construct that has a number of facets, rather than simply defining habit as past behavioral frequency." Accordingly, future studies may apply alternative habit measures, such as the Self-Report Habit Index (SRHI; Verplanken & Orbell, 2003).

Within these limitations, the present approach is the first to provide preliminary evidence that video game use results from users' habits, addictive tendencies, and intentions as simultaneously operating, intertwined factors. Future studies applying advanced measures and designs may help to further illuminate the complex interplay of these factors in the context of media use.

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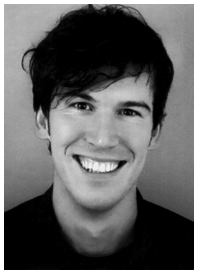

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Appendix

Measures of Intention and of Addictive Tendency

Five-Item Measure of Intention

1. It is extremely unlikely (−3) . . . extremely likely (+3) that I will intend to play [named game] in the next 2 weeks.
2. It is definitely false (−3) . . . definitely true (+3) that I will try to play [named game] in the next 2 weeks.
3. I plan to play [named game] in the next 2 weeks: strongly disagree (−3) . . . strongly agree (+3).
4. I will play [named game] in the next 2 weeks: strongly disagree (−3) . . . strongly agree (+3).
5. I would like to play [named game] in the next 2 weeks: strongly disagree (−3) . . . strongly agree (+3).

Nine-Item Measure of Addictive Tendency

1. I have a hard time keeping my [named game] use under control.
2. I sometimes have to struggle with myself to limit my time playing [named game].
3. I have to keep using [named game] more and more to get my thrills.
4. I have tried unsuccessfully to cut down on the amount of time I spend playing [named game].
5. I feel my [named game] use is out of control.
6. I get tense, moody, or irritable if I can't play [named game].
7. I often think about [named game] even when I am not at my computer or console.
8. I sometimes try to conceal how much time I spend playing [named game] from my family or friends.
9. I would go out of my way to satisfy my [named game] urges.

Nine-item measure from "A Social Cognitive Theory of Internet Uses and Gratifications: Toward a New Model of Media Attendance," by R. LaRose and M. S. Eastin (2004, p. 370). Copyright 2004 by Broadcast Education Association.

